LIGHT IN DARK PLACES,

BY

FRANCES POWER COBBE.

Victoria Street Society

FOR THE PROTECTION OF ANIMALS FROM VIVISECTION,

United with the

International Association

FOR THE TOTAL SUPPRESSION OF VIVISECTION.

Offices:—1, *VICTORIA STREET, LONDON, S.W.*

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THE following pages are intended to convey, in the briefest and simplest form, ocular illustration of the meaning of the much disputed word *Vivisection.* Some of the tools and some of the furniture of the physiological laboratory, various modes of fastening the victims, and a selection of instances of divers experiments, have been arranged with the view of affording the reader by a few moments' inspection a truer idea of the work of the "torture-chambers of science" than can be obtained by the perusal of a vast quantity of letter-press description.

Every one of the illustrations is a reproduction, in most cases of reduced size, by photo-zincography, of the engravings and wood-cuts in the standard works of the most eminent physiologists. In every case the reference to the original work is given, and the perfect accuracy of the reproduction guaranteed. Nothing has been added and nothing has been taken away, except somewhat of the strength and vividness of the larger originals, which have been lost in the reproduction. Thus every illustration in this pamphlet may be taken with certainty to be *a Vivisector's own picture of his own work*, such as he himself has chosen to publish it.

Further, it must be borne in mind that the experiments here exhibited, with the exception of two or three peculiar ones at the end, are not, as might be supposed, single instances of severe operations performed once or twice in a way by one particular

physiologist. The greater number are, so to speak, *stock* experiments. They are gone over by eaeh new reeruit in the army of seience who takes up the study of the organs eoneerned, and may be likened more properly to the seales and exercises of the musieal praetitioner, than to the purposeful operations of the surgeon. In the editor's (Dr. Burdon-Sanderson's) Prefaee to the English *Handbook of the Physiological Laboratory,* he says: "This book is intended for beginners in physiologieal work. It is a book of methods . . designed for workers . ." The whole large volume is in the form of a reeeipt-book for cookery. "Proeeed as above" . . "Divide the lingual nerve" . . . "A eannula having been placed in the carotid, a seeond manometer is placed," &c. "For this purpose, (Asphyxia) a eannula must be fixed air-tight in the trachea," &e. "In these spasms, which aceompany the final gasps of an asphyxiated animal, the head is thrown back, and they must be earefully distinguished by the student from the expiratory eonvulsions previously described,"—and so on through 558 pages. The great foreign treatises of Cyon, Claude Bernard, Paul Bert, and Livon, are to the same purpose.

It is well also to bear in mind as differentiating the operations of Viviseetion from those of ordinary surgery, that whereas the latter is always condueted with the utmost celerity, and the pride of the humane and skilful surgeon is to complete his task in a few minutes or seeonds, the viviseetor is expressly cautioned not to hurry himself, but to perform all his operations slowly, noting each ineident which may arise, and each exhibition of suffering by the animal under the knife.

Finally, as regards anæstheties, it is needful that the reader should dispel from his mind all illusion on the subject. No defence of Vivisection is so frequently offered and so generally aeeepted as the assertion that, in the vast majority of experiments, the animals are rendered wholly insensible to pain by means of anæsthetics. Persons who shrink from the miserable subjeet naturally seize on this assuranee with relief, and thenceforth turn a deaf ear to the advoeates of the suppression of the praetiee. What is the truth of the ease?

There are to be considered: 1st. Real anæstheties (ehloroform,

ether, nitrous oxide, &c.) 2nd. Narcotics (opium, chloral, &c.) 3rd. Mock anæsthetics (Curare).

1. Speaking of REAL ANÆSTHETICS, Dr. Hoggan observed in a letter to the *Spectator*, May 29th, 1875:—

The incalculable advantages which mankind has derived from chloroform as a means of destroying the sense of pain have remained a dead-letter as regards the lower animals, in consequence of the very unsatisfactory state of our knowledge of the line which separates insensibility from death, especially in some of those classes of animals which are most generally employed as the subjects of physiological experimentation. Many of these die apparently before they can become insensible through chloroform, some of them, indeed, as soon as it has been administered. The practical consequence of this uncertainty is, that complete and conscientious anæsthesia is seldom even attempted, the animal getting at most a slight whiff of chloroform, by way of satisfying the conscience of the operator, or of enabling him to make statements of a humane character. Not only, however, are those numerous cases to be regarded with due suspicion in which a slight whiff of chloroform is recommended to be given, but we have also to bear in mind, that, even where complete insensibility has been produced at the beginning of an operation, this effect only endures at most for a minute or two, and during the rest of the operation, to perhaps for hours, the animal must bear its torture as best it may. Continued insensibility could only be maintained by continued careful administration by a special assistant, whose undivided attention would require to be concentrated upon this object. This, I believe, is seldom, if ever done, and even if it were so we should be leaving entirely out of sight that numerous class of operations in which anæsthetics cannot be used, as they would interfere with the correctness of the results; and where, if used, they would render the experiment worse than useless. . . . .

In cases of operations on the human subject, a special assistant gives his whole attention to the administration of the anæsthetic, so as to prevent either a wakening to sensibility, on the one hand, or a sleeping-away into death on the other. Yet, in spite of the exercise of the greatest care, fatal results often occur, so often, indeed, that some medical men make a speciality of the administration of anæsthetics, and undertake no other practice. . . . .

Personally, I may add, that the first experiments which I attempted to make as a student in my own private room failed, because in my anxiety to produce anæsthesia I found that the animal had died before the experiment could be commenced; this, too, at a time when I had much experience in administering chloroform in the operating-theatre of the hospital. I, therefore, gave up the idea of trying such experiments until I had had an opportunity of seeing how experienced vivisectors managed it. I have since then had ample opportunity of seeing, and the result of my experience was embodied in a remark I made in a letter published three months ago, that "I

am nelined to look upon anæstheties as the greatest eurse to viviseetible animals."

2. As to NARCOTICS, this is what Claude Bernard says of the most important of them, *Revue des Cours Scientifiques*, vol. vi. p. 263:—

Morphia is not an anæsthetic, but a nareotie (*stupéfiant*). When it has taken effeet on a dog, he does not seek to eseape ; he has not the knowledge of where he is ; he no longer notiees his master. Nevertheless, sensibility persists, for, if we pineh the animal, he moves and eries. At the same time, morphia plunges dogs into a state of immobility whieh permits us to plaee them on an experimenting-trough without tying or muzzling them.

Thus neither real anæsthetics nor narcotics avail much to assuage the agonies endured by the victims of vivisection.

3. There remains the third alternative, the MOCK ANÆSTHETIC, Curare. Here again Dr. Hoggan bears testimony:—

If there be anything reliable in the results obtained by experimental physiology, it is the ingeniously ascertained effeets of Curare. Could these now be disproved, it would establish the truth of the sneer so often heard, "that Viviseetion only requires to prove a thing, in order that fresh hetacombs of animals be tortured to disprove it."

Claude Bernard, the greatest authority upon, as he is the greatest diseoverer of, the effeets of Curare, says of it in *Revue Scientifique* for 1871-2, p. 892 : "Curare acting on the nervous system only suppresses the aetion of the motor nerves, leaving sensation intaet. Curare is not an anæsthetie." Vol. vi. p. 591 : "Curare renders all movement impossible, but it does not hinder the animal from suffering and from being conseious of pain." These opinions of his are to be found repeated twenty times in the same work, in which he also mentions that they were proved on a human patient, operated upon under the influence of Curare, who was quite sensible throughout, and suffered frightful pain. Even in his latest remarks on the same subjeet (vol. 1874-75, p. 1117) he refers to experiments where the patients on their recovery had been able to relate "that during paralysis they had been fully aware of their existenee, and of all that happened around them." Vulpian also, the next best authority, says in the latest work : "*Leçons sur l'appareil locomoteur*," Paris, 1875, p. 660 : "Curare does not act on the sensory nerves, or, at least, does not abolish their funetion."

Again, Claude Bernard, in his classic paper "On Curare," in the *Revue de Deux Mondes*" for September, 1864, after quoting the opinion of travellers, and more especially of Waterton, says (p. 173):—

Thus all their deseriptions offer us a pleasant and tranquil pieture of

death by Curare. A gentle sleep seems to occupy the transition from life to death. But it is nothing of the sort; the external appearances are deceitful. In this paper it will be our duty to point out how much we may be in error relative to the interpretation of natural phenomena where science has not taught us the cause and unveiled the mechanism. If, in fact, we pursue the essential part of our subject by means of experiments into the organic analysis of vital extinction, we discover that this death, which appears to steal on in so gentle a manner and so exempt from pain, is, on the contrary, accompanied by the most atrocious sufferings that the imagination of man can conceive (and *ante*, p. 162). In this motionless body, behind that glazing eye, and with all the appearance of death, sensitiveness and intelligence persist in their entirety. The corpse before us hears and distinguishes all that is done around it. It suffers when pinched or irritated: in a word, it has still consciousness and volition, but it has lost the instruments which serve to manifest them.

Can we require any more decisive evidence of the entire indifference of physiologists to the agonies they cause, than to read in a subsequent volume *by the same writer*, the complacent statements, made without a syllable of reproval or regret, to his fellow labourers in the torture-field:—

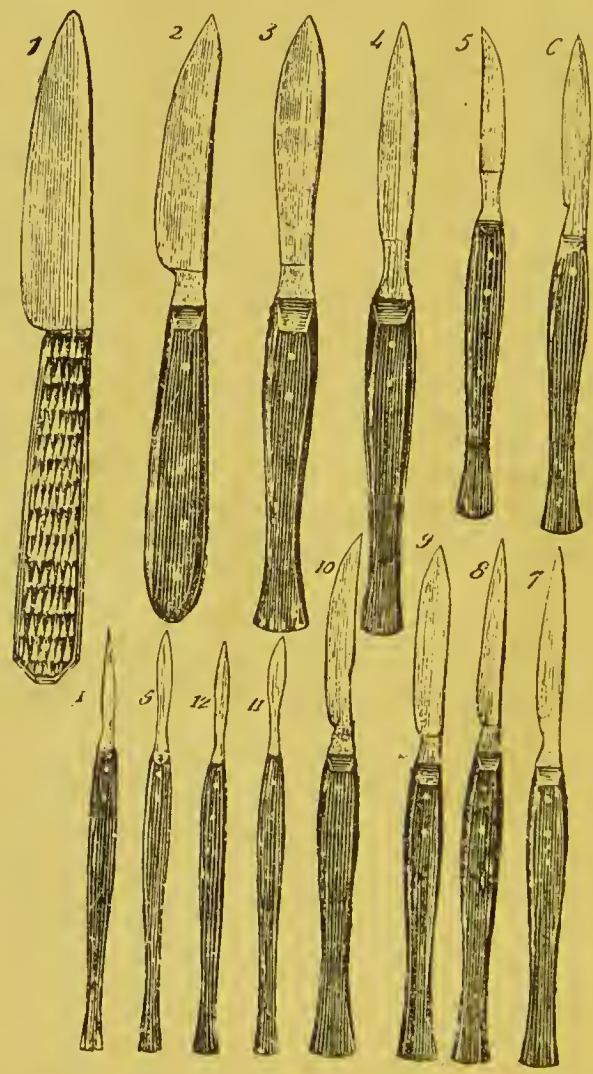
> Curare is now employed in a vast number of experiments as a means of restraining the animals. There are but few observations of which the narrative does not commence by notifying that they were made on a curarised dog.—*Leçons de Physiologie Opératoire*, Paris, 1879, p. 168.

He believes that it creates "the most atrocious sufferings which the imagination of man can conceive" ("des souffrances les plus atroces que l'imagination de l'homme puisse concevoir"), and yet he is perfectly satisfied that it should be "employed in a vast number of experiments as a means of restraining the animals!"

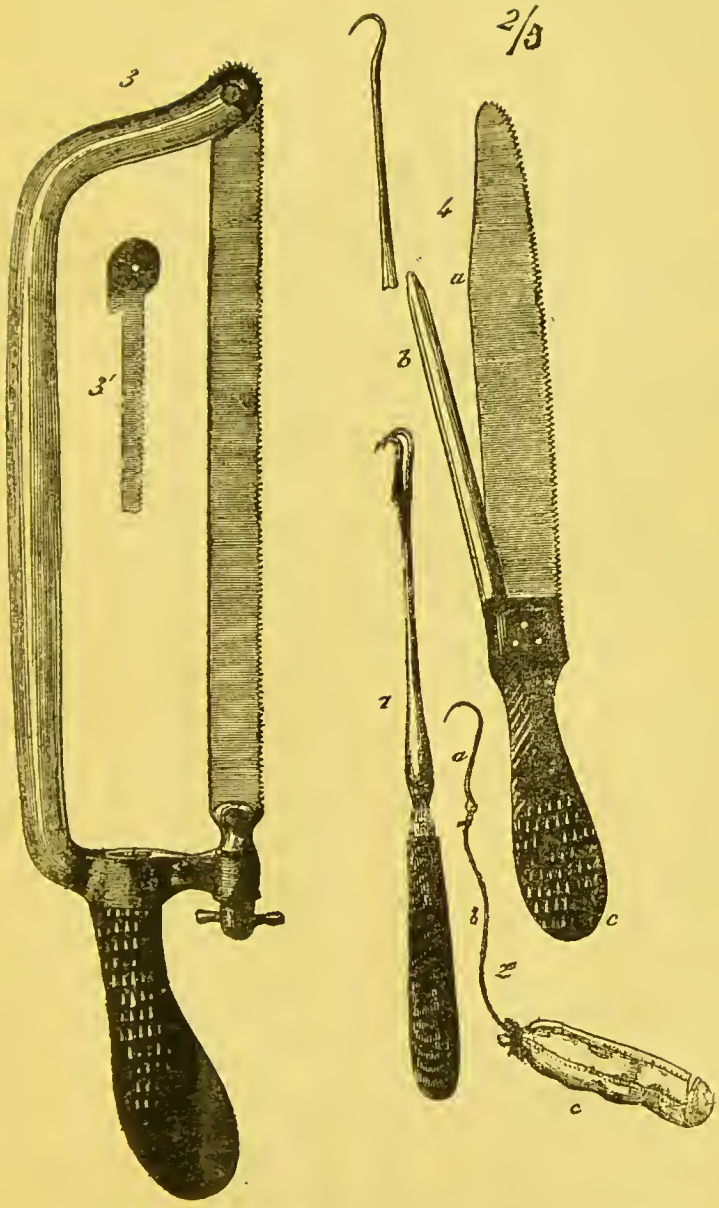
I now proceed to show what are the simplest tools of vivisectors.

The following are taken (much reduced) from Bernard's last great work, the *Physiologie Opératoire*, Paris, Baillière et Cie, 1879. They consist of various forms of scissors, pincers with claws, crooked pincers, scalpels, crooks with single and double claws, crochets with thread and weights attached, saws and knives.

From Bernard's *Physiologie Opératoire*, p. 184.



From Bernard's *Physiologie Opératoire*, p. 186.



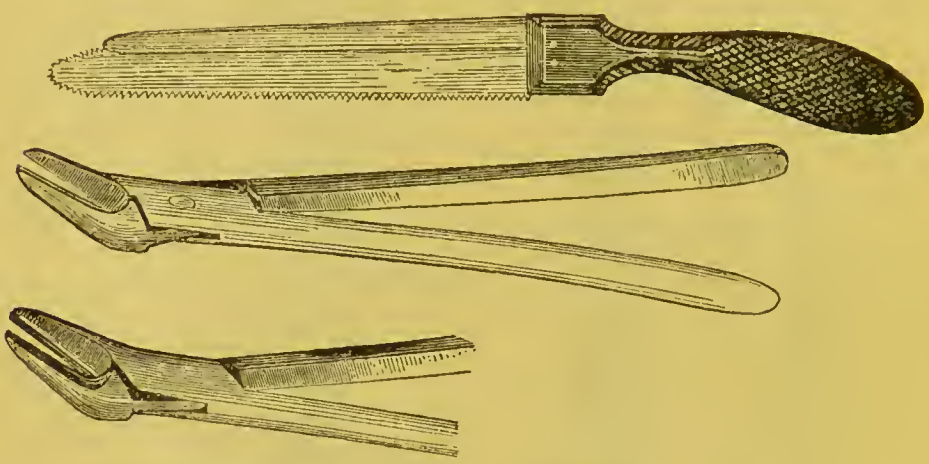
From Bernard's *Physiologie Opératoire*, p. 188.

The next illustration is taken from Livon's *Manuel de Vivisection* (Bailliere, Paris), p. 8, a book issued in 1882 from the new school of Vivisection in Marseilles. The three instruments are described respectively as—

"A little saw for sawing the vertebræ."

"Pincers to open the vertebral canal."

"Pincers of which the teeth cross like scissors intended to cut the bones of old animals."

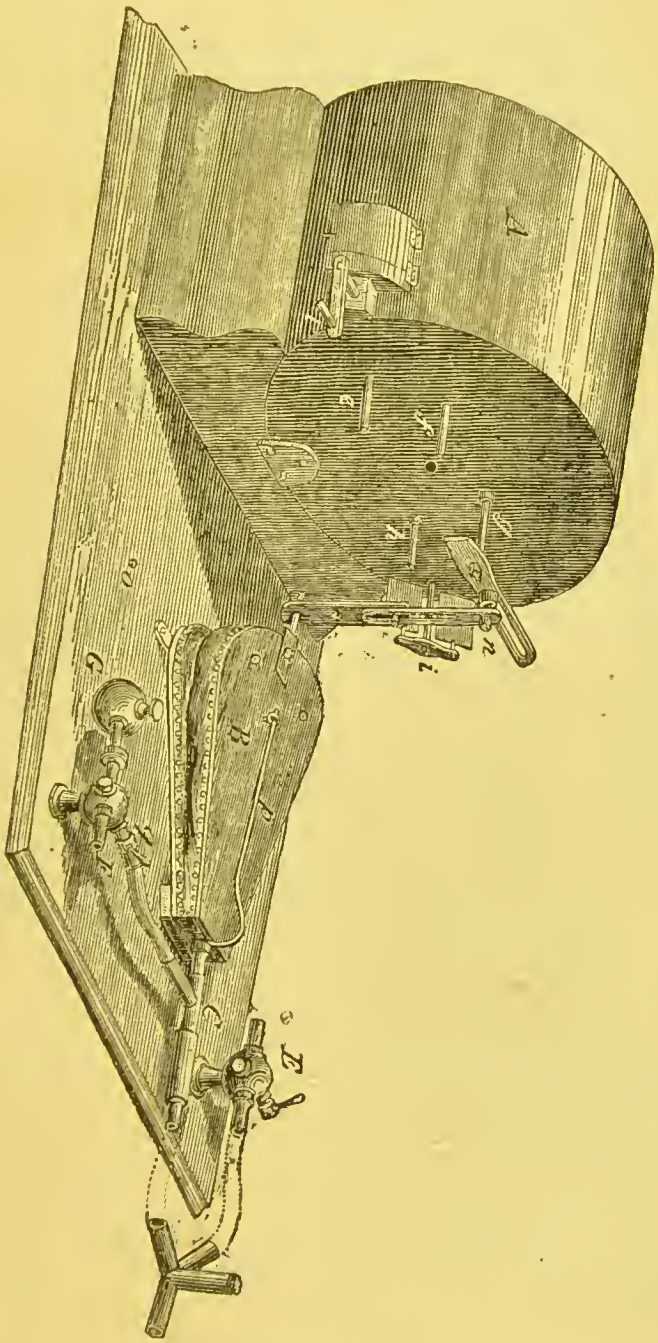


Livon's *Manuel de Vivisection*, p. 8.

We next reach (page 11) one of the many instruments in use (this is Schwann's) for sustaining Artificial Respiration. It is to be understood that when an animal is curarized the muscles are so completely paralyzed that it ceases to breathe, and would immediately die were not artificial breathing kept up by pumping air into the lungs. This is sometimes done by hand, but in large laboratories it is customary to keep a water-engine or steam-engine at work for the purpose. In Ludwig's laboratory it has been stated that the engine in question never ceases playing day or night, sustaining life in the dogs and other animals extended on the vivisecting tables around.

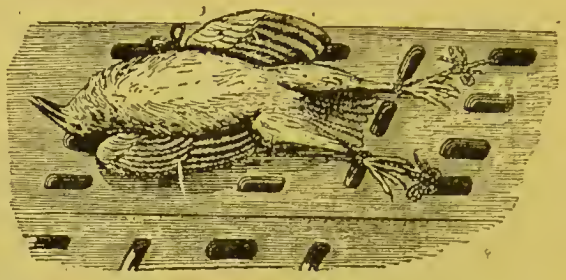
There are an immense number of other instruments, some infinitely more elaborate and costly than this, in use in laboratories, and figured in the various treatises; and their various makers in London (Messrs. Hawksley, Messrs. Cettie and Co., Messrs. Elliot and Co.), and in Paris, Heidelberg, Berlin, Wurzburg, &c., are variously specified and recommended (vide in particular the list of

such instruments, and where they can best be procured, in Dr. Burdon-Sanderson's *Handbook*, p. 573). Plates exhibiting these costly instruments fill 43 large pages of Cyon's *Atlas*, and 21 of the English *Handbook*, and afford convincing proof of the enormous extent of a practice which can require and defray the expense of manufacturing such tools.

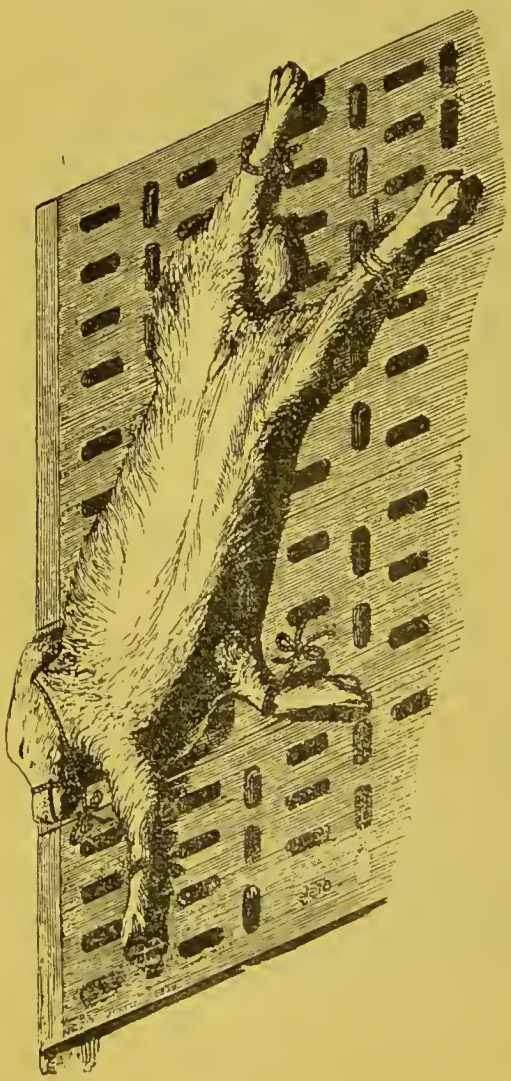


Instrument for producing Artificial Respiration.
From Bernard's *Physiologie Opératoire*, p. 227.

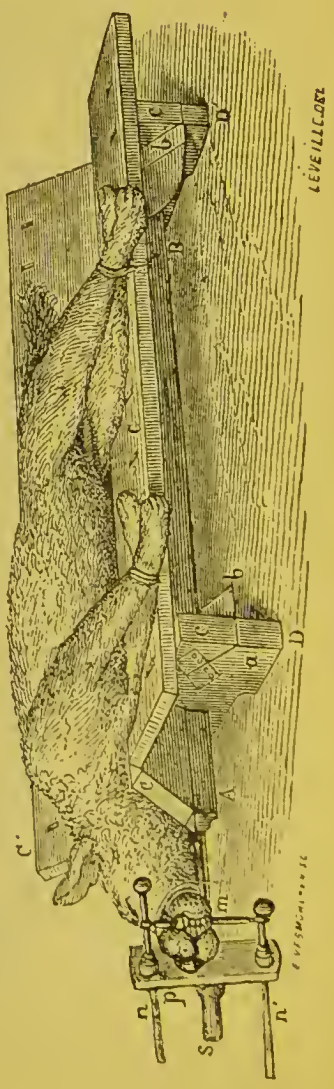
I next pass to the various forms of the Vivisecting Tables—or Torture-troughs as they have been called—in use in every laboratory. From the simple table with holes, through which cords are conveniently passed to bind the limbs of the animal, (page 12) to the more elaborate trough and double trough, (pages 12 and 13) the illustrations explain themselves.



From Bernard's *Physiologie Opératoire*, p. 126.



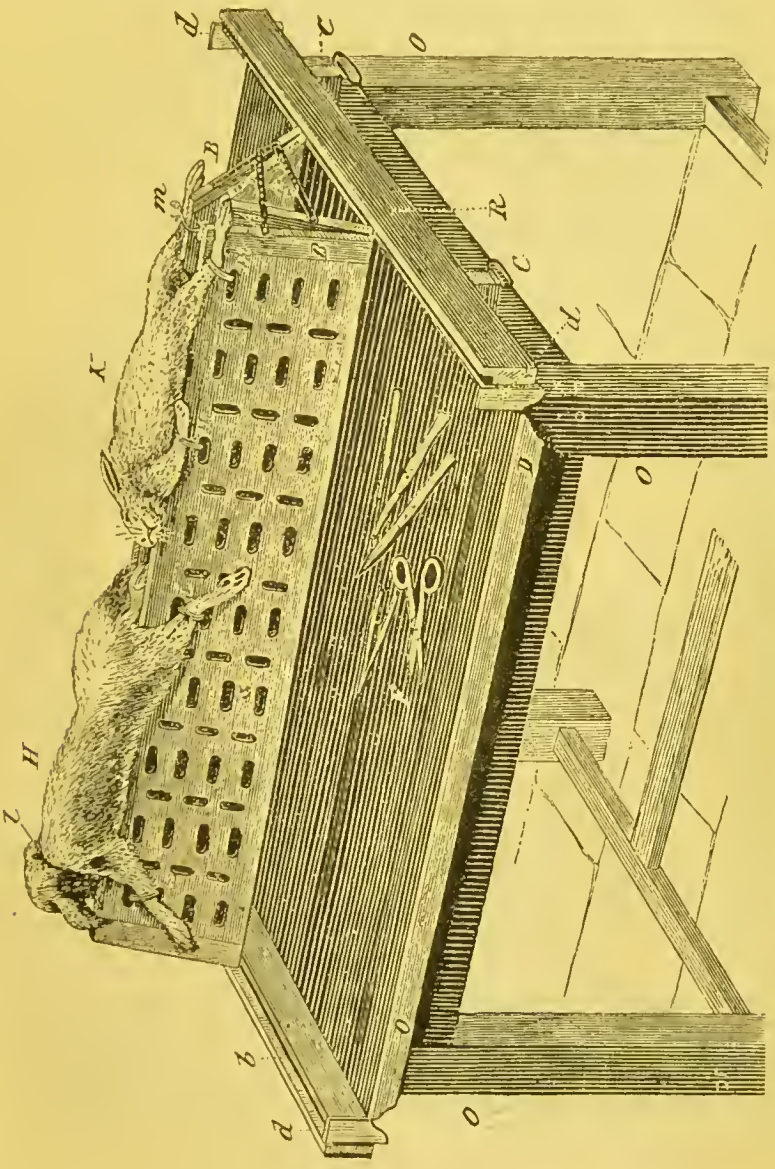
From Bernard's *Physiologie Opératoire*, p. 125.



From Bernard's *Physiologie Opératoire*, p. 135.

With respect to the last illustration, of the rabbit and dog on the trough with an elevated ridge, it will be seen how well the instrument would serve for the experiment lately shown to students in Florence, described in the *Zoophilist* for May 1st, as follows:—

The following story has been sent us on the best authority from Florence:—

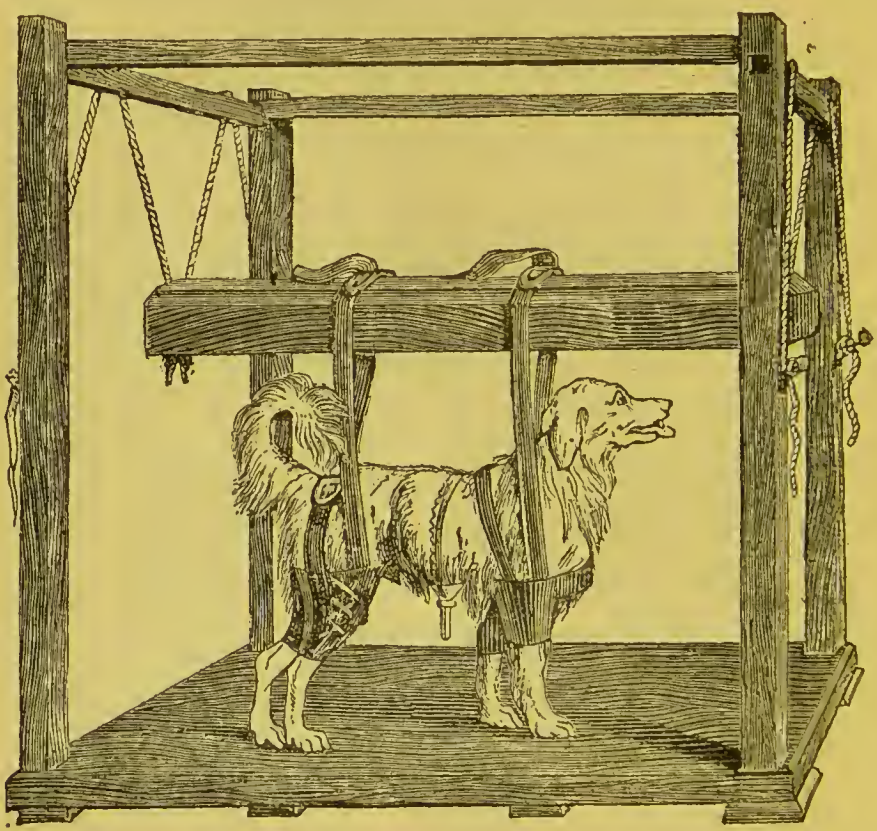


A Dog and Rabbit on a Torture Trough.
From Bernard's *Physiologie Opératoire* p. 131.

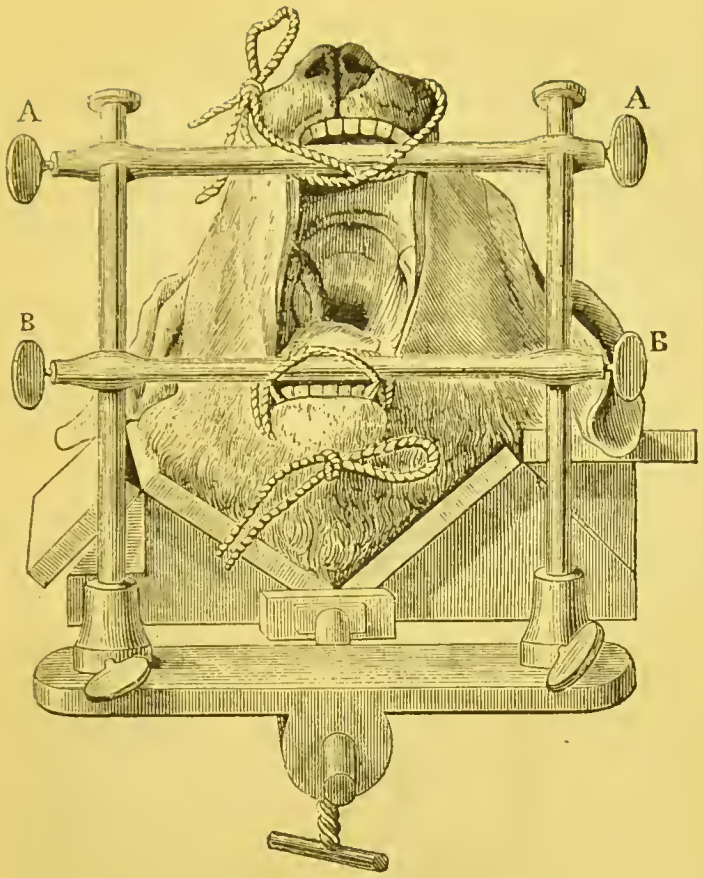
A young man, son of a well-known and respected veterinary surgeon, gives this account of the spectacle he witnessed at a lecture :—

"A dog, with its four feet fastened to a table, and supported by a sort of *chevalet*" (no doubt the usual vivisecting trough reversed), "had its skin cut and turned back all along the back from the neck to the tail. This was done in such a way that the whole spine was laid bare, and the tendons exposed so that they could be touched like the strings of an instrument with a pincer. To each touch responded a cry of agony like the notes of a violin. The scene was so revolting that after a time the young man left the place."

Again, we have illustrations of elaborate methods of suspending a dog's body (page 14) when the experiment requires an upright position ; and of a dog's head (page 15) when the jaw is to be kept open.



Cyon, Table xxvi. Fig. 7.



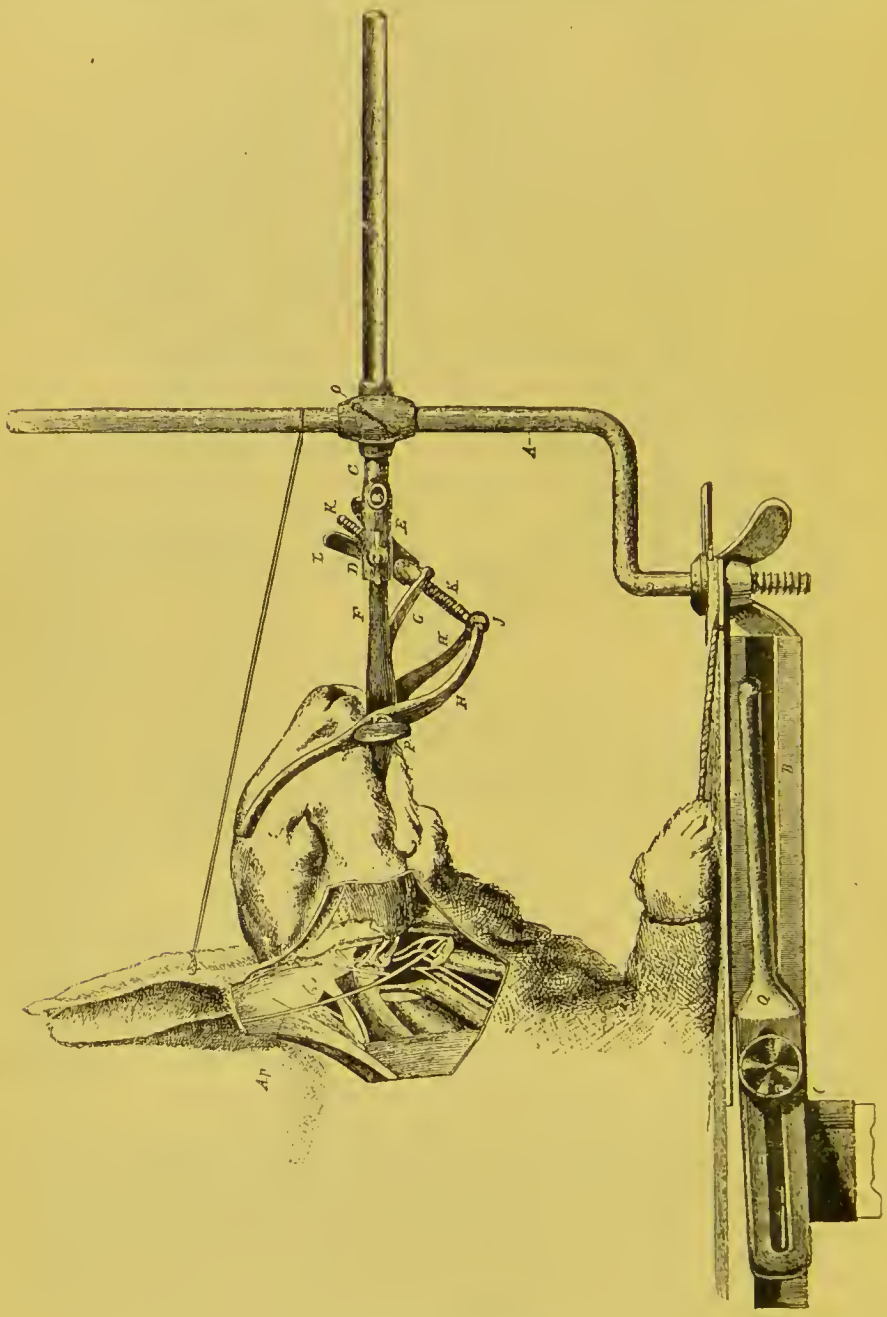
From Bernard's *Physiologie Opératoire*, p. 137.

The next illustration (page 16) represents an instrument very frequently mentioned in these works;—Czermak's Rabbit-holder, with the rabbit's head fixed in it, and the nerves of the neck dissected out. This illustration, as well as several subsequent ones, is taken from M. de Cyon's splendid volume, the *Methodik der physiologischen experimente und vivisectionen*, with Atlas (Giessen, St. Petersburg, 1876).

It is in the preface to these volumes that M. de Cyon gives his well-known description of a true viviseetor :—

"The true viviseetor must approach a difficult vivisection with the same joyful excitement, and the same delight, wherewith a surgeon undertakes a difficult operation, from which he expects extraordinary consequences. He who shrinks from cutting into a living animal, he who approaches a vivisection as a disagreeable necessity, may very likely be able to repeat one or two

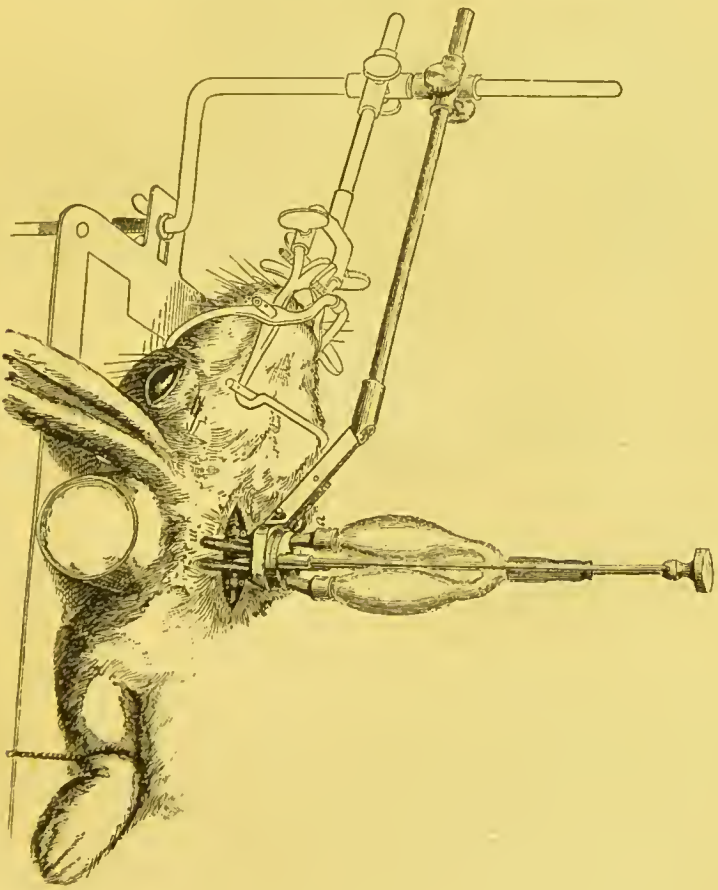
vivisections, but will never become an artist in vivisection. He who cannot follow some fine nerve-thread, scarcely visible to the naked eye, into the depths, if possible sometimes tracing it to a new branching—with joyful alertness for hours at a time; he who feels no enjoyment when at last, parted from its surroundings and isolated, he can subject that nerve to electrical



Cyon, Table vii.
Czermak's Rabbit Holder, with nerves of Rabbit dissected out.

stimulation ; or when, in some deep cavity, guided only by the sense of touch of his finger-ends, he ligatures and divides an invisible vessel ; to such a one there is wanting that which is most necessary for a successful vivisector. The pleasure of triumphing over difficulties held hitherto insuperable is always one of the highest delights of the vivisector And the sensation of the physiologist, when from a gruesome wound, full of blood and mangled tissue, he draws forth some delicate nerve-branch, and calls back to life a function which was already extinguished—this sensation has much in common with that which inspires a sculptor, when he shapes forth fair living forms from a shapeless mass of marble."—*Methodik*, p. 15.

Here is another machine, invented by Ludwig, one of the leading members of the Leipzig Society for Protection of Animals, and, at the same time, the head of one of the largest physiological laboratories in the world.



Cyon, Table xxii.
Ludwig's Machine for measuring the rate of the blood-current in arteries of rabbits.

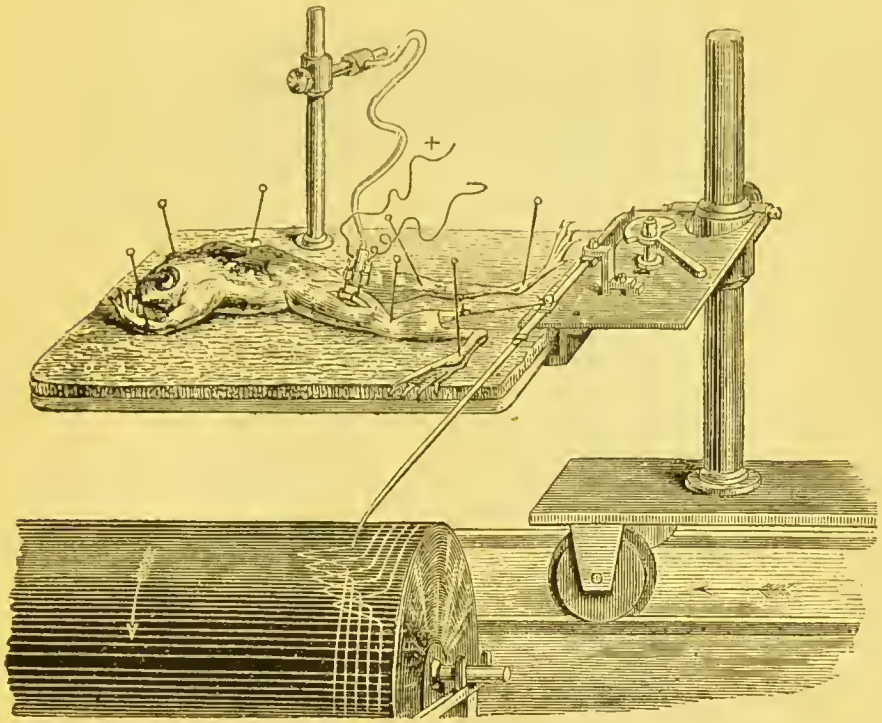
The next illustration (page 18) exhibits one of the minor processes of vivisection, an experiment intended to test the time required for poisons to circulate through the system.

Experiment for testing the time required for injected poisons to traverse the circulation.

From Bernard's *Physiologie Opératoire*, p. 372.

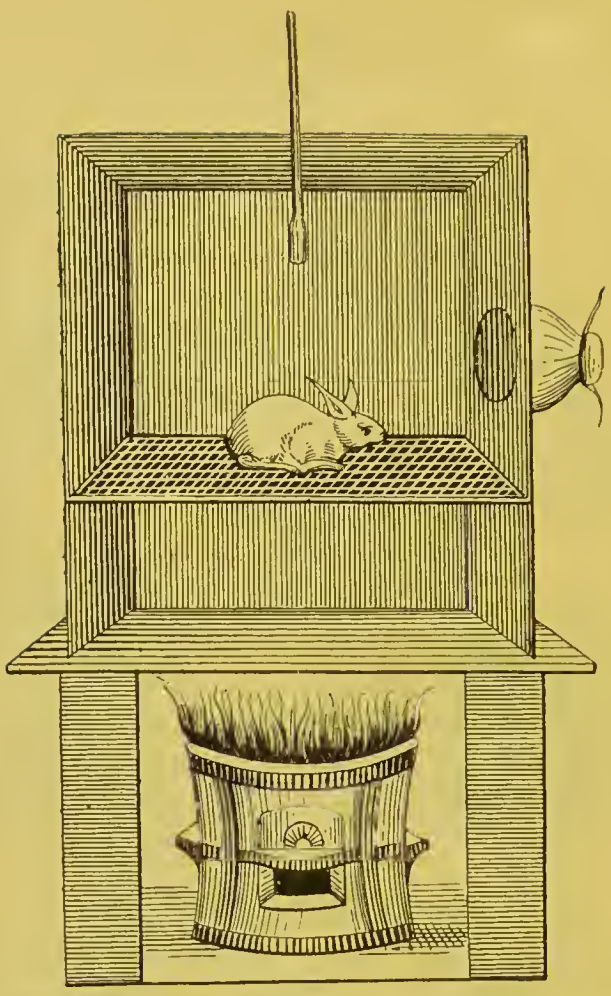
Here (page 19) is an experiment (not a painful one, for the frog is already pithed and practically dead), exhibiting the manner in which frogs,—the poor creatures which Marshall Hall blasphemously called "God's Gift to the Physiologist,"—are fixed on what is termed a myograph.

The illustration is taken from the second volume of the *Handbook of the Physiological Laboratory*, Plate ciii.



Handbook of the Physiological Laboratory, Plate ciii.

We now come (page 20) to an illustration which will be recognised by many readers—the first of the two Stoves invented and used by Claude Bernard. It is taken from his *Leçons sur la Chaleur Animale*, Paris, 1876, p. 347, and represents, as M. Bernard states, his "first apparatus for the study of the Mechanism of Death by Heat." Of the results of experiments made with it he prints several tables. These tables show how dogs, pigeons, and rabbits baked in the stove, expired at the temperatures of 90° or 100° Cent. in 6 minutes, 10 minutes, 24 minutes, &c., and at higher temperatures at different intervals; and again how, when, the apparatus formed a hot bath (*i. e.* the animal was boiled instead of baked alive), a different scale of heat and subsequent death was observed. A small dog placed in a temperature of 55° expired after 8 minutes, and so on. Again, another series of results were obtained when the head of the victim was kept outside the stove, while its

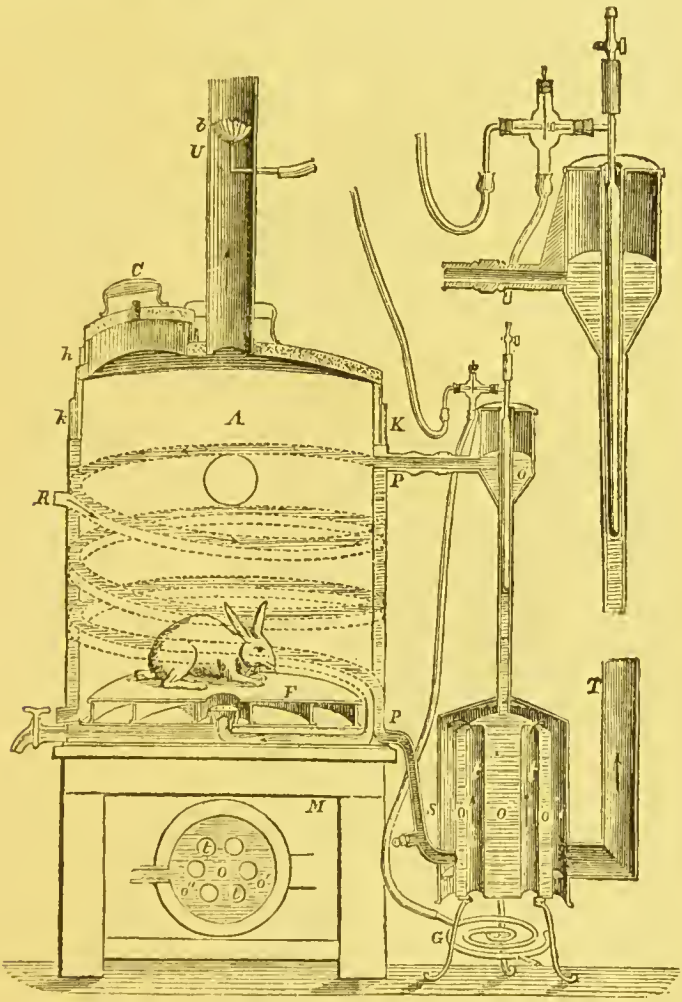


Bernard's *Leçons sur la Chaleur Animale*, p. 347.

body was baked or boiled. "The animals" (M. Bernard notes, page 356) "exhibit a series of symptoms always the same and characteristic. At first the creature is a little agitated. Soon the respiration and circulation are quickened. The animal opens its mouth and breathes hard. Soon it becomes impossible to count its pantings; at last it falls into convulsions, and dies generally in uttering a cry."

In a subsequent table M. Bernard gives the particulars of the deaths in this apparatus of seventeen dogs and of numerous rabbits and pigeons; and then proceeds in the next lecture to show his pupils (for *these* are *lectures to students*) the diagram of another and more elaborate stove, in which many other series of animals were sacrificed.

Here (page 21) is the second and more elaborate stove invented and used by M .Bernard, of which the aspect is less familiar. He says of it, p. 361:—"The machine which served our first experiments presented an imperfection which rather complicated the phenomena, and might in a certain degree vitiate the appreciation of the action of temperatures on living beings. . . . The machine of which we have recently availed ourselves, has not this inconvenience—" (Then follows a long description.)

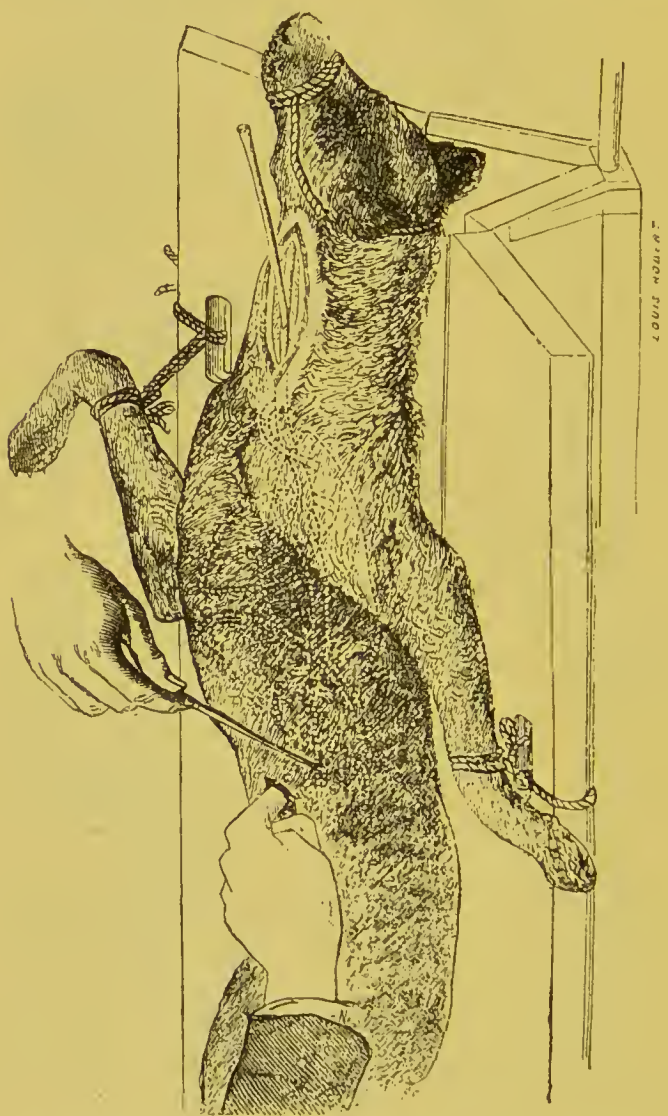


Bernard's *Leçons sur la Chaleur Animale*, p. 363.

"In the stove we place a sparrow. The temperature is about 65° (Centigrade). At the end of a minute we see the animal open its beak, manifest an anxiety which becomes more and more lively, breathe tumultuously, then fall and die. . . .

We try the same experiment on a rabbit. The same series of phenomena are exhibited, but more slowly, for it only dies at the end of twenty minutes. . . . ."

I now come to experiments in what is called Catheterism. They are described at great length in Claude Bernard's *Physiologie Opératoire.* The illustration (page 22) represents catheterism of the blood-vessels, showing how long flexible tubes are inserted at some convenient part of a superficial blood-vessel, and then pushed along into the different parts of the heart and deeper blood-vessels. Blood



From Bernard's *Physiologie Opératoire*, p. 282.

may thus be obtained from a given part for analysis; or the temperature may be ascertained in such otherwise inaccessible regions. In these experiments there is no pretence of giving anæsthetics; and as a matter of fact as well as logic none are given, for they would greatly interfere with the results when a careful analysis is to be made of the blood so obtained from special regions, or when it is a question of the temperature which normally exists there.

To the above description we may add that the jugular vein in the neck of the bound-down and muzzled animal has first been carefully dissected out and opened into, and, through the opening thus made, the bent tube or catheter has been inserted and pushed down through the heart into the great vein which brings the blood from the liver and hinder part of the body.

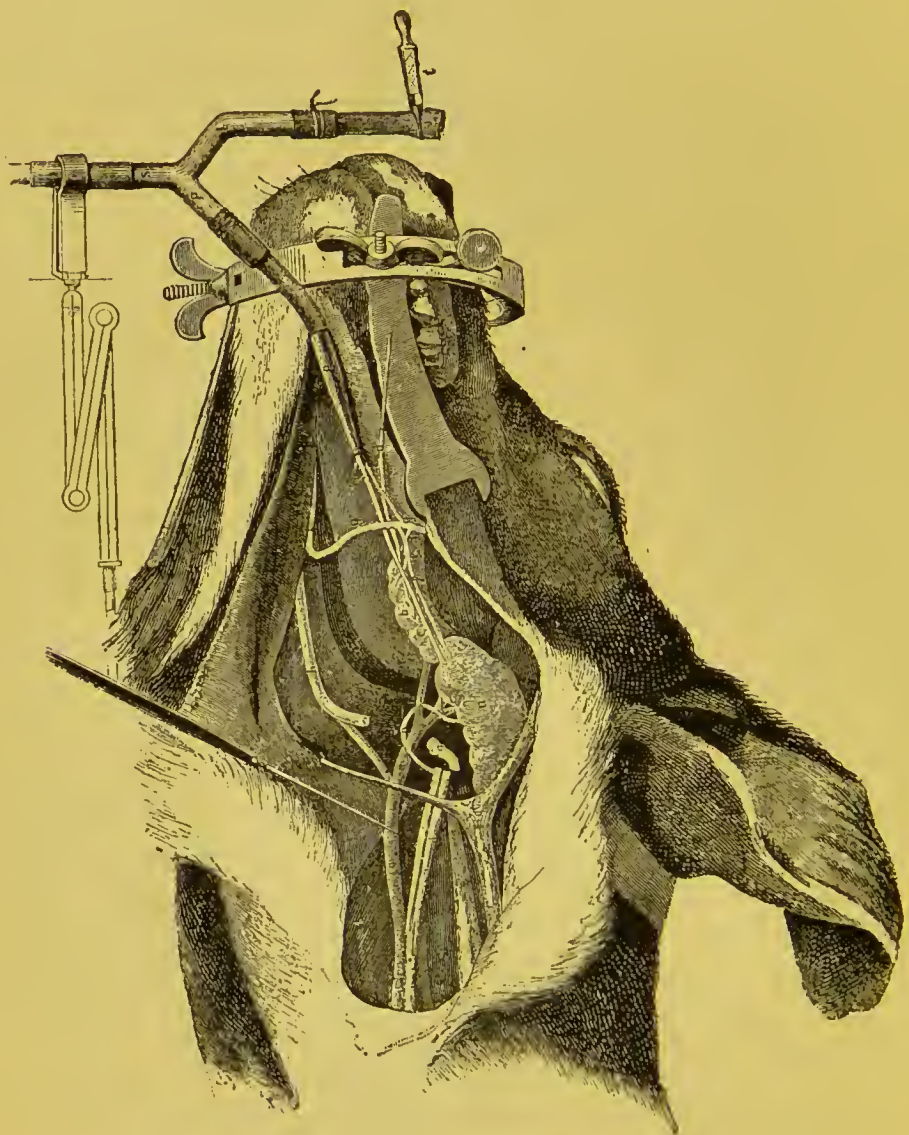
The next figure (page 24) represents a dog with the salivary glands, and the nerves supplying those glands, exposed. A cannula (small pipe) is fixed into the duct of the gland. A muzzle of an elaborate kind is screwed upon the jaws.

M. de Cyon in his article in the *Contemporary Review*, April 1883, mentions this drawing (which was one of those exhibited life-size on the hoardings of London in 1877), and asserts that it was drawn from the dead body of the animal. It may be possible that the actual dog from which M. de Cyon made his sketch was at that moment no longer living, but that the hideous mutilations exhibited in the drawing had been inflicted while he was still living is proved by two circumstances,—one by the presence of the elaborate muzzle, which assuredly no one would have placed on the corpse of a dog,—and secondly, by the presence of the cannula fixed into the duct of the salivary gland; a gland which of course, like any other, ceases to secrete at death, and into which therefore it is absurd to suppose a cannula to draw up the secretion would have been inserted. M. de Cyon's assertion that the dog represented is a dead one is also thoroughly disposed of by an extract from his own book quoted in an excellent letter by Mr. Ernest Bell published in the *Spectator*, April 7th, 1883. Speaking of the plates in M. Cyon's work—

"When he tells us that these plates are, 'of course, drawn from the dead

body of the animals,' he probably is speaking the literal truth as regards the plates, but in as far as he wishes us to infer that the operations they represent were done on the dead body, he is saying what his books show to be untrue. For, concerning one of the plates (No. xv.), I find on p. 264 of the work the following paragraph :—

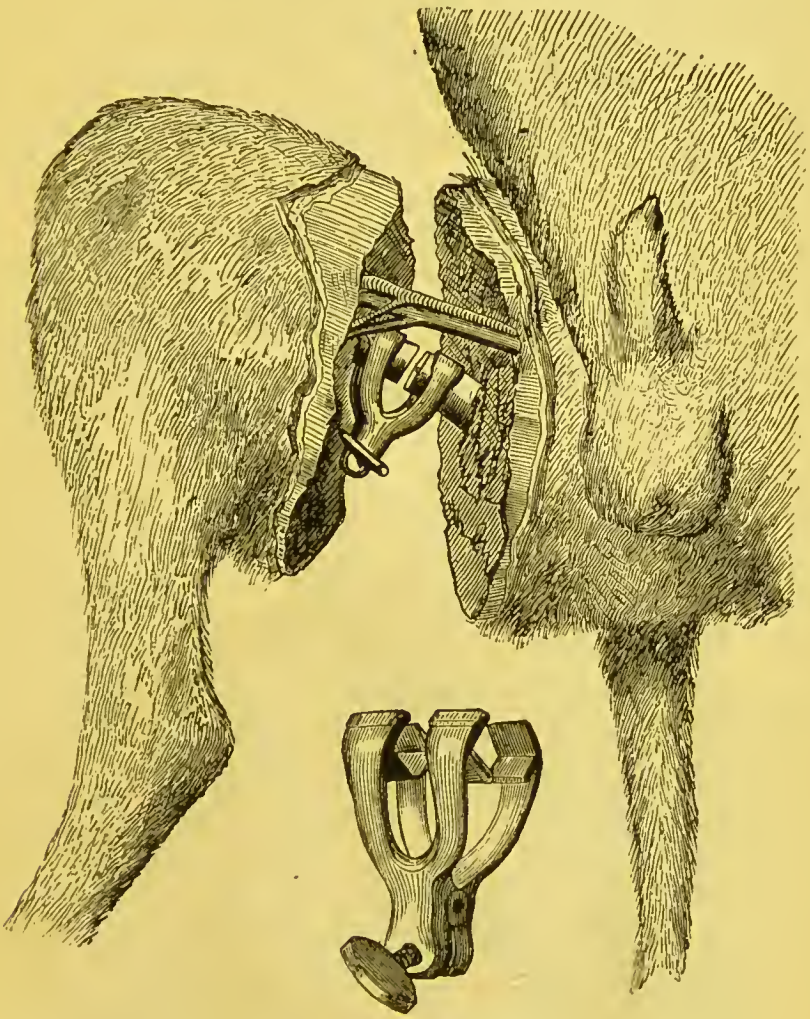
'If the experiment is made only for demonstration, one can drug the animal beforehand with chloral, chloroform, or curari; and if the last named poison is applied, artificial respiration must be used. If, on the other hand, one wishes to use the experiment for purposes of observation, particularly if the investigation concerns the influence of the circulation on the



From Cyon's *Atlas*, Table xv. (See preceding page.

activity of the glands, it is better to avoid these drugs, on account of their influence on the circulation. One should choose for the experiment strong, lively animals, which have been well fed for a few days previously."

The next illustration (page 25) represents the leg of a dog. The animal has been placed under anæsthetics, and the whole limb severed, including the bone, with the exception of the main artery and vein, through which the strychnine injected into the trunk passes into the severed limb.



From Bernard's *Physiologie Opératoire*, p. 337.

The following illustration (page 26) is the triumph of M. Paul Bert's genius, and certainly exhibits in a remarkable degree the fitness of that gentleman to exercise (as he did two years ago) the function, under M. Gambetta's Government, of Minister of Worship and Public Instruction. So proud is M. Bert of this achievement in thus transforming a living dog into the resemblance of a piece of wood (*un morceau de bois*) that his portrait has been exhibited in Paris holding up the tortured animal in the attitude depicted.

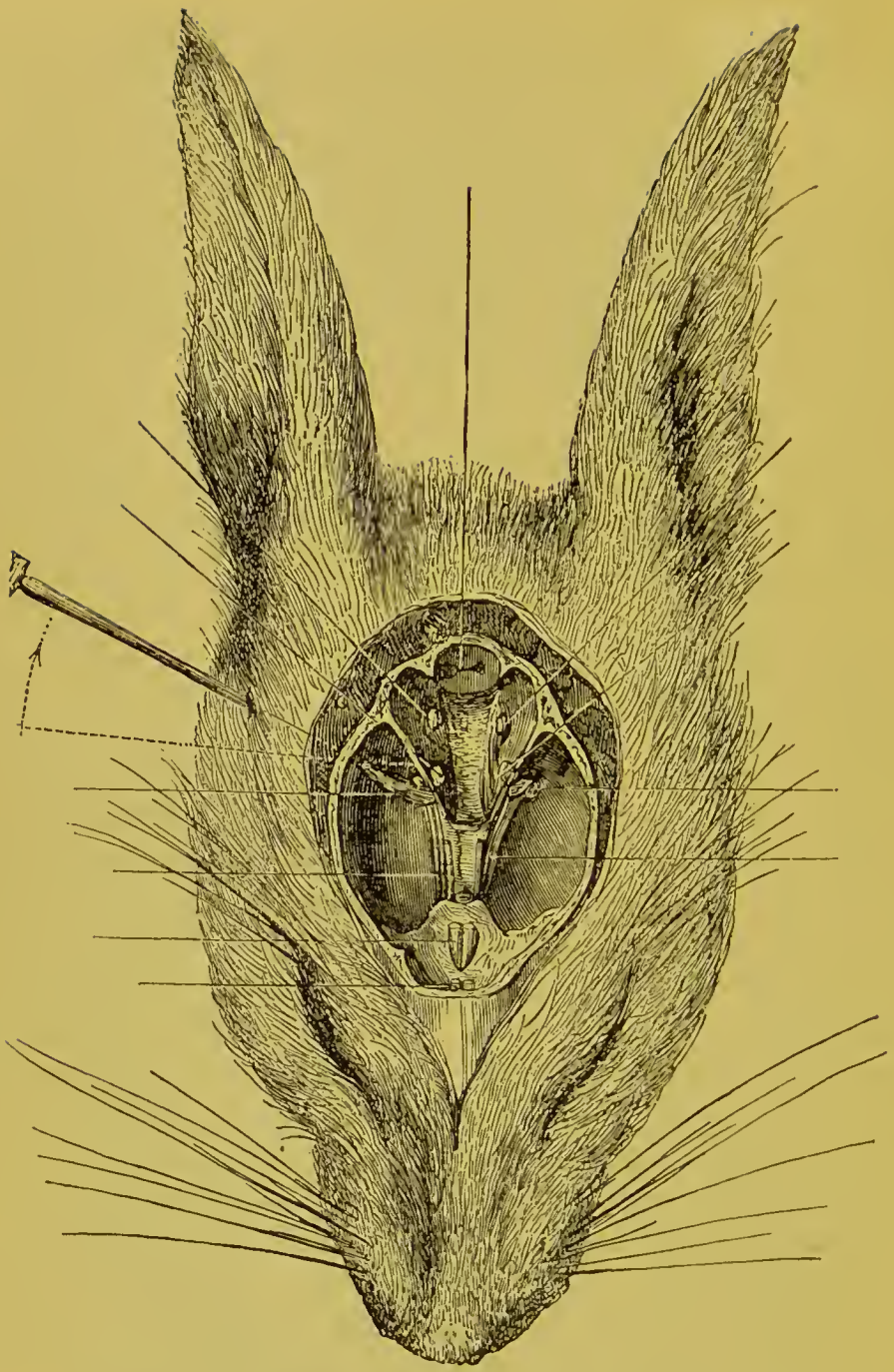
Paul Bert's *Pression Barométrique*, p. 800.

"Let us reach," says M. Bert in his large book on *La Pression Barométrique*, p. 800, "the description of the convulsive attack (produced by placing the victim for hours under compressed oxygen). It is really curious and frightful. (*effrayante.*)

Let us take a case of medium intensity. When the animal is taken out of the machine it is generally in full tonic convulsions. The four paws are stiffened, the trunk is recurved backwards, the eyes are starting from the head, the jaws clenched. Soon there is a sort of loosening to which succeeds a new crisis of stiffenings with clonic convulsions, resembling at once a crisis of strychnine poisoning, and an attack of tetanus . . . Sensibility is preserved . .

In lighter cases, instead of attacks so violent as this, one may lift the animal by one paw like a piece of wood, as Figure 61 shows. We observe disordered movements and local convulsions," &c.

The next illustration (page 28) represents the head of a rabbit, of which the top of the skull is removed to shew the position of the nerves, and the instrument is exhibited piercing the head and reaching the nerves (the trigeminus) on which it is desired to operate. The description given by Cyon of the method of operation (*Methodik*, p. 510) is as follows: "The rabbit is firmly fastened to the ordinary vivisecting table by means of Czermak's holder. Then the rabbit's head is held by the left hand, so that the thumb of that hand rests on the condyle of the lower jaw. This is used as a *point d'appui* for the insertion of the knife. . . . To reach the hollow of the temple the instrument must be guided forward and upward, thus avoiding the hard portion of the temporal bone and leading the knife directly into the cranial cavity. . . . . The trigeminus then comes under the knife. Now holding the head of the animal very firmly, the blade of the knife is directed backwards and downwards and pressed hard in this direction against the base of the skull. The nerve is then generally cut behind the Gasserian ganglion, which is announced by a violent cry of agony (*einen heftigen Schmerzensschrei*) of the animal."



Cyon's *Atlas*, Table xxxv.

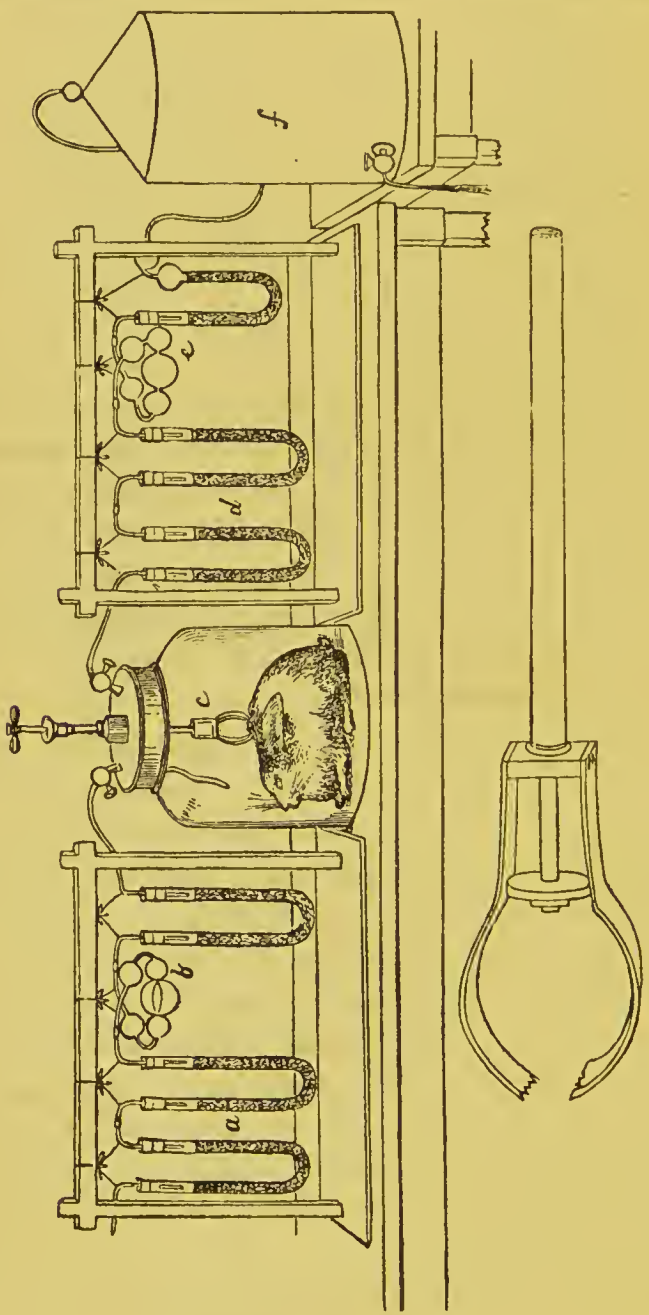
The experiments of Ferrier on monkeys and of Goltz on the brains of dogs, involve different mutilations, with scooping out of the brains till, in some cases, they resemble, as Goltz has said, a "lately-hoed potatoe-field."

Lastly, we arrive at an illustration (page 30) which cannot be quite classed with the preceding, having been (so far as I know) merely the private delight or toy (he avows he has used it *con molto amore*) of a single physiologist.

Signor Paolo Mantegazza, a brilliant Italian gentleman, and *Bel'uomo*, author of books of travels, of tender reminiscences of *La Mia Mammà*; of a treatise on "Good and Evil," and on the "Hygeiene of Love"; set himself to study the physiology and philosophy of Pain, on which he afterwards composed a work, *La Fisiologia del Dolore* (Florence, Felice Paggi, editore, 1880) from whence we derive our information and our illustration. To study pain properly it was necessary, so Professor Mantegazza thought, to create the most intense pain he could possibly contrive; and with this object in view he devised various combinations. One, which he found excellent, consisted in "planting nails sharp and numerous, through the feet of the animal, in such a manner as to render the creature almost motionless, because in every movement it would have felt its torment more acutely" (*piantando chiodi acuti e numerosi attraverso le piante dei piedi in modo da rendere immobile o quasi l'animale, perchè ad ogni movimento avrebbe sentito molto più acuto il suo tormento*). Further on he mentions that, to produce still more intense pain (*dolore intenso*) he was obliged to employ lesions followed by inflammation.

Going a little further he devised, and, with the help of an ingenious machinist in Milan, brought into working order, the instrument depicted in our illustration, which is exactly reproduced from his book, p. 98. This machine enabled him to grip any part of an animal with pincers with iron teeth, and to crush, or tear, or lift up the victim, "so as to produce pain in every possible way." The first series of his experiments, Signor Mantegazza informs us, were tried on twelve animals, chiefly rabbits and guinea pigs, of which several were pregnant. One poor little creature, "far advanced in pregnancy," was made to endure *dolori atrocissimi*, so that it was impossible to make any observations in consequence of its convulsions. In the second series of experiments twenty-eight animals were sacrificed, some of them taken from nursing their young, exposed to torture for an hour or two, then allowed to rest an hour,

and usually replaced in the machine to be crushed or torn by the Professor for periods of from two to six hours more. In the table wherein these experiments are summed up, the terms *molto dolore* and *crudeli dolori* are delicately distinguished, the latter being apparently reserved for the cases when the victims were, as the Professor expresses it, *lardellati di chiodi* (larded with nails).



Mantegazza, *Del Dolore*, *p.* 98.

In conclusion, the author informs us (p. 27) that these experiments were all conducted *con molto amore e pazienza.*

Such are a few, out of scores of illustrations which might be added, of the practice of Vivisection which its advocates strive to make the British Parliament and public believe is almost wholly painless to the victims, and involves nothing more serious than "scratching a newt's tail" or "exhibiting a frog's foot under a microscope."

WESTMINSTER:
Printed by NICHOLS AND SONS, 25, Parliament Street.

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